

REMARKS

In response to the above-identified Office Action, Applicants amend the application and seek reconsideration thereof. In this response, Applicants amend Claims 1 and 3. Applicants do not cancel or add any claims. Accordingly, Claims 1-8 are pending.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attachment is captioned "Version With Markings To Show Changes Made."

I. Claims Rejected Under 35 U.S.C. § 102(e)/103(a)

The Patent Office rejects Claims 1-4 under 35 U.S.C. 102(e)/103(a) as being anticipated by and alternatively obvious over U.S. Patent No. 6,139,990 to Kubota, et al. ("Kubota").

In order to anticipate a claim, the relied upon reference must disclose every limitation of the claim. In order to render a claim obvious, the relied upon reference must teach or suggest every limitation of the claim such that the invention as a whole would have been obvious at the time the invention was made to one skilled in the art. Among other limitations, amended independent Claims 1 and 3 both recite a negative active material for a lithium secondary battery comprising a heat-treated artificial graphite carbon material (emphasis added). Applicants submit that at least this limitation is neither taught nor suggested by Kubota.

In maintaining the rejection, the Patent Office relies on Kubota to show a graphite carbon material with an intensity ratio less than 0.04, which can be used as a material for an electrode in a lithium-ion secondary cell. The Patent Office acknowledges that Kubota fails to teach the claimed method for preparing graphite carbon material but concludes that the end material would have been obvious, regardless of the manner of preparation.

In response, Applicants note that Kubota is directed towards modifying a natural graphite element (emphasis added) (Abstract; Col. 2, lines 45-47, 59-60; Col. 3, lines 18-20). In fact, it appears as though Kubota is strictly limited to the use of natural graphite since Applicants have been unable to find a reference to non-natural graphite anywhere in the specification and claims.

However, Applicants' amended independent Claims 1 and 3 recite that the negative active material comprises an artificial graphite carbon material. Support for this limitation can be found in

→ Applicants' specification at page 8, lines 9-11 (e.g., synthesized carbon). The cited portion of Applicants' specification indicates that the structure of the artificial carbon, when changed by the various methods disclosed in the specification, is different from natural graphite. Thus, Applicants' negative active material comprising artificial graphite carbon, regardless of the manner of preparation, is neither taught nor suggested Kubota.

Accordingly, Applicants respectfully request withdrawal of the rejection of independent Claims 1 and 3. Claims 2 and 4 respectively depend from independent Claims 1 and 3 and are not anticipated or obvious for at least the same reasons.

The Patent Office rejects Claims 1-8 under 35 U.S.C. 102(e)/103(a) as being anticipated by and alternatively obvious over U.S. Patent No. 5,906,900 to Hayashi, et al. ("Hayashi").

In maintaining the rejection, the Patent Office relies on Hayashi to show a carbonaceous material having carbonized material attached to the surface of a graphite material. In response, Applicants note that independent Claims 1, 3, and 5 recite that either a coal tar pitch or a petroleum pitch is dissolved in an organic solvent to remove organic-insoluble components in order to obtain organic-soluble components. The organic-soluble components, previously obtained by dissolving, are then heat treated.

Only a cursory review is necessary to see that Hayashi heats the entire mixture (e.g., carbonaceous material, organic substances, and a solvent) (Col. 5, line 65-Col. 6, line 3), which is not the same as heat-treating organic-soluble components obtained by dissolving pitch in a solvent to remove organic-soluble components, as recited in Applicants' independent claims. Necessarily, both the method and the product formed by the method of Hayashi are different from the method and product formed by the method of Applicants' Claims 1, 3, and 5. Moreover, Hayashi is directed to coating graphites with the solution (e.g., pitch and organic solvent), which results in a coated material with a composite structure. Thus, Hayashi fails to teach or suggest at least the limitations discussed above.

Accordingly, Applicants respectfully request withdrawal of the rejection of independent Claims 1, 3, and 5. Claims 2, 4, and 6-8 respectively depend from independent Claims 1, 3, and 5 and are not anticipated or obvious for at least the same reasons.

II. Claims Rejected Under 35 U.S.C. § 103(a)

The Patent Office rejects Claims 5-8 under 35 U.S.C. 103(a) as being obvious over U.S. Patent No. 5,721,071 to Sonobe, et al. ("Sonobe").

In maintaining the rejection, the Patent Office relies on Example 4 of Sonobe to show a petroleum pitch having a quinoline-insoluble content of 1 wt% that is heat treated at 600°C for one hour (coking) in a nitrogen gas stream. The pitch is then pulverized to obtain carbon precursor particles. The carbon precursor particles are then carbonized and graphitized to obtain a graphitic material.

In response, Applicants submit that it is improper to conclude from the pitch content alone that Example 4 of Sonobe teaches the process steps of dissolving a petroleum pitch in a quinoline solvent and removing the insoluble components therefrom before heat treatment. Rather, it appears as though the petroleum pitch of Example 4 is a natural pitch without any pre-treatment (e.g., such as dissolving in an organic solvent). However, Applicants' independent Claim 5 specifically recites that the pitch is to be dissolved in an organic solvent to remove organic-insoluble components therefrom and to obtain organic-soluble components. Subsequently, the organic-soluble components, having the organic-insoluble components removed, are heat treated as recited in Applicants' independent Claim 5.

This is an important distinction since the pitch of Sonobe's Example 4 could not be used to perform the method or to obtain the product of the method of Applicants' independent Claim 5. Specifically, the quinoline-insoluble components in the pitch of Example 4 are mainly carbon black or macromolecules with high molecular weight, which are known to decrease the fluidity of the pitch and to prevent crystallization during graphitization. Thus, Sonobe fails to teach or suggest all of the limitations of independent Claim 5.

Accordingly, Applicants respectfully request withdrawal of the rejection of independent Claim 5. Claims 6-8 depend from independent Claim 5 and are not obvious at least for the same reasons.

CONCLUSION

In view of the foregoing, it is believed that all claims now pending (1) are in proper form, (2) are neither obvious nor anticipated by the relied upon art of record, and (3) are in condition for allowance. A Notice of Allowance is earnestly solicited at the earliest possible date. If the Examiner believes that a telephone conference would be useful in moving the application forward to allowance, the Examiner is encouraged to contact the undersigned at (310) 207-3800.

If necessary, the Commissioner is hereby authorized in this, concurrent and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2666 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17, particularly, extension of time fees.

Respectfully submitted,

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CERTIFICATE OF TRANSMISSION:

I hereby certify that this paper is being facsimile transmitted to the U.S. Patent and Trademark Office on April 14, 2003.

Raul D. Martinez 4/14/03
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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

Please amend the claims as follows:

1. (Five Times Amended) A negative active material for a lithium secondary battery, comprising a heat-treated artificial graphite carbon material having no particular shape and an intensity ratio $I(110)/I(002)$ of an X-ray diffraction peak intensity $I(002)$ at a (002) plane to an X-ray diffraction peak intensity $I(110)$ at a (110) plane of less than 0.2, the negative active material prepared by

dissolving a coal tar pitch or a petroleum pitch in an organic solvent to remove organic-insoluble components therefrom and to obtain organic-soluble components;

heat-treating the organic-soluble components at a temperature in the range of 400 to 450 °C for 4 hours or more under an inert atmosphere to thereby produce at least 50 weight percent of mesophase particles based on the pitch;

coking the pitch including mesophase particles;

carbonizing the coked pitch;

pulverizing the carbonized pitch; and

graphitizing the pulverized pitch.

3. (Five Times Amended) A lithium secondary battery comprising:

a negative electrode comprising a negative active material;

a positive electrode comprising a lithium containing material that can reversibly intercalate and de-intercalate lithium ion; and

a non-aqueous electrolyte;

the negative active material comprising a heat-treated artificial graphite carbon material having no particular shape and an intensity ratio $I(110)/I(002)$ of an X-ray diffraction peak intensity $I(002)$ at a (002) plane to an X-ray diffraction peak intensity $I(110)$ at a (110) plane of less than 0.2 and the negative active material prepared by

dissolving a coal tar pitch or a petroleum pitch in an organic solvent to remove organic-insoluble components therefrom and to obtain organic-soluble components;

heat-treating the organic-soluble components at a temperature in the range of 400 to 450 °C for 4 hours or more under an inert atmosphere to thereby produce at least 50 weight percent of mesophase particles based on the pitch;

coking the pitch including mesophase particles;

carbonizing the coked pitch;

pulverizing the carbonized pitch; and

graphitizing the pulverized pitch.